

## CLAIMS

1. A process for making a crimped tow of filaments suitable for forming a  
5 bale of crimped tow for conversion to cigarette filter rods comprising, presenting  
an uncrimped tow of filaments in a banded condition, adhesively bonding to the  
filaments of the banded tow, porous particles having adsorbent surfaces imparting  
filtration capacity for tobacco smoke constituents, and crimping the banded tow,  
wherein the process comprises the steps of:
- 10 (i) pre-treating the particles to load them with a material capable of  
generating a gaseous emission from the particles thus forming pre-treated  
particles;
- (ii) applying to the filaments of the banded tow, the pre-treated particles  
and an adhesive for bonding the particles to the filaments; and subsequently
- 15 (iii) treating the tow to generate the gaseous emission from the pre-treated  
particles so as to limit deactivation of the adsorbent particle surfaces by the  
adhesive.
2. A process according to Claim 1 wherein the step of pre-treating the  
20 particles has a duration of between 12 to about 24 hours.
3. A process according to Claim 1 or Claim 2 wherein the surface area of the  
porous particles is approximately  $100\text{m}^2\text{g}^{-1}$ .
- 25 4. A process according to any one of the preceding claims characterised in  
that the material capable of generating a gaseous emission from the particles is a  
liquid which can be volatilized to generate a gas or a vapour by the action of heat  
and/or reduced pressure.
- 30 5. A process according to any one of the preceding claims characterised in  
that the material is water which can be volatilized to generate steam.

6. A process according to any of the preceding claims characterised in that the pre-treated particles and the adhesive are applied to the banded tow at the same time.

5 7. A process according to Claim 6 characterised in that the pre-treated particles and the adhesive are pre-mixed before application to form a dispersion of the pre-treated particles in the adhesive.

8. A process according to any of Claims 1 to 7 characterised in that the pre-  
10 treated particles comprise activated carbon, silica gel, a zeolite, an ion-exchange resin, or a clay, or a mixture of any of them.

9. A process according to Claim 8 characterised in that the pre-treated  
15 particles comprise activated carbon particles having a mean particle diameter in the range of 0.1 micron to 3.0 mm.

10. A process according to Claim 9 characterised in that the mean particle diameter of the pre-treated particles is in the range 1 to 20 microns.

20 11. A process according to any of Claims 8 to 10 characterised in that the particles are steeped in water as the pre-treatment for loading them with water.

12. A process according to any one of the preceding claims characterised in that the adhesive is a water soluble adhesive.

25 13. A process according to any of Claims 1 to 12 characterised in that the adhesive is a cellulose ether.

14. A process according to Claim 13 characterised in that the adhesive is  
30 methyl cellulose used as an aqueous solution.

15. A process according to any one of Claims 1 to 12 characterised in that the adhesive is polyvinyl pyrrolidone.

16. A process according to any one of the preceding claims characterised in that the filaments of the tow have a cross-section having concave portions in which the adhered particles may lie.

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17. A process according to Claim 16 characterised in that the filaments have a cross-section which is a multi-lobal shape.

18. A process according to any one of the preceding claims characterised in that the filaments of the tow are cellulose acetate filaments.

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19. A process according to Claim 7 and any claim dependent thereon, characterised in that the dispersion of the pre-treated particles in the adhesive is applied to the banded tow by passing a face of the banded tow over a surface onto which the dispersion is flowed.

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20. A process according to Claim 19 characterised in that the surface comprises an exterior surface of a tubular body and an interior portion, the tubular body being penetrated by a pattern of holes through which the dispersion is flowed from the interior of the tubular body to said exterior surface.

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21. A process according to any preceding claim characterised in that the banded tow is crimped directly after application of the pre-treated particles and the adhesive before the adhesive is dried and cured.

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22. A process according to Claim 21 characterised in that the banded tow is treated to generate the gaseous emission from the pre-treated particles directly after the crimping step.

23. A process according to Claim 22 characterised in that the crimped banded tow is given a heat treatment both to generate the gaseous emission from the particles and to dry and cure the adhesive.

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24. A process according to any preceding claim characterised in that, after drying and curing of the adhesive, the banded tow is given a stretching treatment in order to effect a degree of breakage of inter-filament bonds caused by the adhesive.

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25. A process according to any one of the preceding claims characterised in that the adsorbent surfaces of the porous particles impart a selective filtration capacity for smoke constituents to the crimped tow.

10 26. A crimped tow of filaments suitable for conversion to cigarette filter rods characterised by being made by a process as claimed in any of the preceding claims.

15 27. A crimped tow of filaments suitable for conversion to cigarette filter rods characterised by being made by a process as claimed in any of Claims 1 to 25, in which porous particles having adsorbent surface imparting filtration capacity for cigarette smoke constituents, are adhered to the surface of the filaments of the tow by an adhesive, wherein the particles retain at least 20 per cent of their adsorbent surface areas available for adsorption of cigarette smoke stream constituents.

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28. A crimped tow of filaments according to Claim 27 characterised in that the particles comprise activated carbon particles having a mean particle diameter in the range 1 to 20 microns.

25 29. A crimped tow of filaments according to Claim 27 or Claim 28 characterised in that the filaments of the tow comprise cellulose acetate filaments having a cross-section having concave portions in which adhered particles lie.

30 30. A crimped tow of filaments according to Claim 29 characterised in that the filaments have a cross-section which is a multi-lobal shape.

31. A filter rod characterised by being made from a crimped tow of filaments as claimed in any of Claims 26 to 30.

32. A cigarette filter characterised by being made from a filter rod as claimed in Claim 31.
- 5 33. A filter for a cigarette or a cigarette smoke filtration device comprising a crimped tow as claimed in any of Claims 26 to 30, and a plurality of porous particles adhesively attached thereto, the surface area of particles being at least  $100 \text{ m}^2\text{g}^{-1}$ .
- 10 34. An applicator for applying particles formed as a dispersion in an adhesive, to at least one surface of a banded tow, the applicator comprising a plenum chamber, and a plurality of orifices, the particles being applied to the banded tow via the orifices, characterised in that, the dispersion is delivered to the applicator by a metering pump, the speed of the metered pump being controlled in relation to  
15 the speed of travel of the banded tow, whereby the flow rate of the particles exiting from each orifice is substantially constant along the length of the applicator.
- 20 35. An applicator according to Claim 34 wherein the plenum chamber comprises a tubular body having an interior portion, the plurality of orifices forming a pattern of holes extending from the exterior surface of the tubular body into the interior portion, and through which the dispersion may flow from the interior portion of the tubular body to the exterior surface.
- 25 36. An applicator according to Claim 34 or Claim 35, wherein the length of the tubular body is variable.